

ALL-OPTICAL INTERCONNECT UTILIZING POLARIZATION GATES

ABSTRACT OF THE DISCLOSURE

The present invention includes a switch element 100 (Figs 3A-3B) which utilizes a single polarizer 110 to couple two discreet inputs to any combination of two discreet outputs along non-blocking optical paths. This switch element 100 may be conveniently networked to additional switch elements 100 for scaling to switches having larger numbers (N) of inputs and outputs such as shown as switches 150 and 150' in Figs. 4-6. The present invention provides advantages typically associated with conventional polarization gates, including terabit per-second data rates, to facilitate use in fiber-optics networks. Moreover, unlike conventional optomechanical switches, the present invention is relatively robust and insensitive to environmental disturbances and has a reconfiguration time which is an order of magnitude faster than conventional optomechanical switches which generally require tens of milliseconds before reconfiguration. Furthermore, the present invention provides constant data pathlength for constant "latency", loss, and unskewed data output. The present invention also advantageously provides

for convenient scaling to a non-blocking  $N \times N$  configuration using  $N \cdot (\log_2 N - 1)$   $2 \times 2$  switches rather than conventional approaches which require  $N(\log_2 N)$  switches, for a relatively simple and compact configuration.